

mottled with greenish buff; beneath, the throat and breast grey, the tips of the feathers brown; belly greenish buff, shading off into white on the under tail-coverts; wing-quills and tail black, the former edged outwardly with a narrow line of white; wing-coverts and secondaries black, edged with brown-pink; irides dark hazel; bill and feet horn-colour.

Dimensions. Total length 5·20 inches, wing 3·10, tail 2·20, culmen ·55, tarsus 1·5.

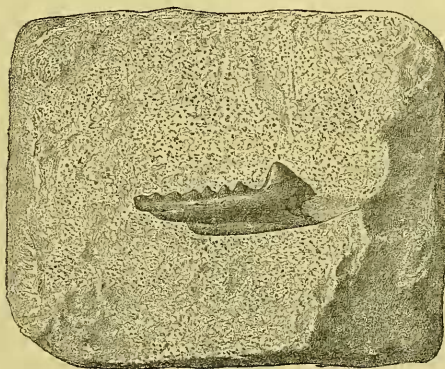
Hab. Maui.

5. On British Remains of *Homæosaurus*, with Remarks on the Classification of the Rhynchocephalia. By G. A. BOULENGER.

[Received February 3, 1891.]

The specimen which I have the pleasure of exhibiting before the Society is the greater portion of the left ramus of a mandible which

Fig. 1.



Left mandibular ramus of *Homæosaurus major* (specimen in the College of Surgeons) and *H. maximiliani* (after v. Ammon). Natural size.

agrees, except in the larger size, with that of *Homæosaurus maximiliani*, H. v. Mey.¹, an Upper Jurassic Rhynchocephalian Reptile, remains of about half a dozen individuals of which are known from Bavaria. The chief interest of this specimen lies in its being believed to be

¹ H. v. Meyer, Jahrb. Miner. 1847, p. 182, and Faun. d. Vorwelt, Rept. Lithogr. Schief. p. 101, pl. xi. (1860).

L. v. Ammon, Abh. bayer. Akad. xv. p. 499, 2 pls. (1885).

British, having been found along with other unnamed fossils from this country in the Museum of the College of Surgeons. I have submitted the specimen to my colleague Mr. Etheridge, who was so kind as to examine the matrix and have a section of it prepared, and he informs me that the fossil is in all probability from the Forest Marble, Bath Oolite, of Chippenham or Corsham, Wiltshire. Mr. A. Smith Woodward, for whose kind advice I likewise applied, on being shown the specimen at once produced another, a left maxillary showing its inner aspect, of what I believe to be probably the same animal, but surrounded by a very different matrix. This specimen, recently acquired for the British Museum from Mr. P. Rufford, was obtained in the Purbeck beds of Swanage, Dorsetshire; it bears the Museum Register No. R. 1765, had been identified by Mr. Woodward as Rhynchocephalian, and was most courteously placed by him at my disposal for examination.

The left ramus in the Museum of the College of Surgeons is imperfect anteriorly, but the missing portion cannot have been great, as may be deduced from the condition of the teeth, of which there are seven, gradually decreasing in height from back to front, so that the symphysial end of the mandible must have had a sharp, nearly straight edge, as we know to be the case in *Homœosaurus*. The coronoid process is perfectly preserved, triangular, its height nearly equalling that of the jaw. The postcoronoid portion is lost, but has left its impression on the stone, and it agrees with the corresponding part in *Homœosaurus*, differing in its shortness from *Sphenodon*. The bone is of a dark brown colour. The length of the entire mandibular ramus must have been about 35 millim., as against 25 in *H. maximiliani*. In this respect it agrees with the specimen from the Kimmeridgian of Hanover described by Struckmann¹. There is no doubt, in my opinion, that the larger size of the Hanover specimen is not to be attributed to age, considering the state of the dentition in the typical *H. maximiliani*, which indicates an adult animal; and as I can find no difference between the Hanover specimen and the mandible described above, I propose to designate them both as *H. major*. Comparison cannot, unfortunately, be instituted with *Sapheosaurus*, H. v. Mey., which agrees very nearly in size, but of which the mandible and the alveolar border of the maxillary are still unknown.

As regards the systematic position of *Homœosaurus*, there can be no doubt that it stands in close relation to the living *Sphenodon*, from which it differs, however, in three important points, viz. the absence of the ectepicondylar foramen in the humerus, the absence of uncinate processes to the ribs, and the absence of intercentra or hypapophyses between the dorsal vertebræ, to which characters a fourth may probably be added, viz. the fuller ossification of the vertebral centra, which appear to be less deeply excavated at either end than in *Sphenodon*. All these characters, except the absence of uncinate processes, may be regarded as indicating a higher development in the Rhynchocephalian line. I hold that of the two most recent writers on the

¹ Zeitschr. deutsch. geol. Ges. xxv. p. 249, pl. vii. (1873).

classification of the Rhynchocephalia, Lydekker¹ and Zittel², the former has overrated the importance of these characters in assigning to *Homœosaurus* and allies the rank of a suborder, opposed to *Sphenodon*, *Rhynchosaurus*, and *Hyperodapedon*; while the latter has underrated their importance in uniting *Homœosaurus* and *Sphenodon* in one and the same family. *Homœosaurus* deserves to stand as the type of a distinct family, in the immediate neighbourhood of the *Hatteriidae*, to which it is more nearly related than to the *Rhynchosauridae* or than are the latter to the *Hatteriidae*.

The classifications of the two authors above referred to differ as follows:—

1. LYDEKKER.

Ord. Rhynchocephalia	{ Subord. Homœosauria	{ Fam. <i>Homœosauridae</i> . " <i>Pleurosauridae</i> . " <i>Telerpetidae</i> . " <i>Sphenodontidae</i> . " <i>Rhynchosauridae</i> .
Ord. Proterosauria	" <i>Proterosauridae</i> .

Champsosaurus is not mentioned, but forms a third Suborder (*Simœdosauria*) of the Rhynchocephalia in the author's more recent Manual³.

2. ZITTEL.

Ord. Rhynchocephalia	{ Subord. Rhynchocephalia s. s.	{ Fam. <i>Sphenodontidae</i> . " <i>Rhynchosauridae</i> . " <i>Proterosauridae</i> . " <i>Mesosauridae</i> . " <i>Champsosauridae</i> .
	{ Subord. Proganosauria

Both these arrangements appear to me unsatisfactory. The Proterosauria are allowed ordinal rank by Lydekker merely provisionally and "in deference to the views of Prof. Seeley." But his definition of the Order is not diagnostic, for such characters as "Cervical vertebræ much elongated" and "Posterior caudal vertebræ with divided neural spines" can certainly not be meant to characterize an Order. As to the latter character in particular, I have to remark that it occurs in certain Lacertilia, and is particularly marked in a genus which, one would think, might not have escaped notice. I now exhibit a skeleton of *Lacerta ocellata*, with the object of showing the curious division of the neural spine of some of the caudal vertebræ (fig. 2, p. 170) into an anterior and a posterior part, as believed to be characteristic of the Proterosauria. In the specimen exhibited, the caudal vertebræ, from the 9th to the 19th inclusively (the rest of the tail being regenerated), bear two neural spines, the anterior directed obliquely forwards, the posterior directed obliquely backwards. Both are processes of the posterior moiety of the vertebra (the caudal vertebræ of these and other fragile-tailed Lizards being divided into two), thus showing that the division of the spine has

¹ Cat. Foss. Rept. i. p. 290 (1888).

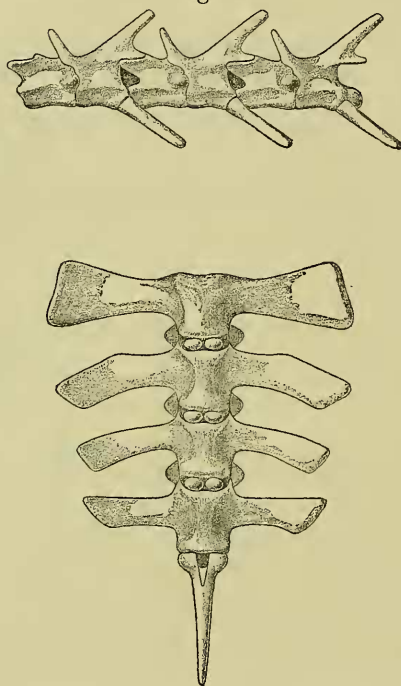
² Handb. Pal. iii. p. 583 (1889).

³ Nicholson and Lydekker, Man. Pal. ii. (1889).

nothing to do with the division of the vertebra. I have also noticed a less complete division, or rather bifurcation, of the caudal neural spines in *Agama bibronii*. The specimen further shows very clearly the paired intercentral hypapophyses at the base of the tail, to which attention was called by me at a previous meeting¹.

Returning to the classification of Lydekker, I can only repeat what I have said above as to his division of the Rhynchocephalia into two suborders *Homœosauria* and *Sphenodontina*, that the only

Fig. 2.



Lateral view of middle caudal vertebræ, and lower view of second sacral and three anterior caudal vertebræ of *Lacerta ocellata*. Twice natural size.

diagnostic differences revealed by the definitions are that in the former the præmaxillaries apparently do not form a beak and the ribs have no uncinæ processes, whilst in the latter the præmaxillaries form a more or less deflected beak and the ribs have uncinæ processes. These characters, even if well founded, would be insufficient for subordinal separation; but they are not exact, for it is well known that *Sphenodon* has præmaxillary teeth; it is therefore

¹ See above, p. 114.

incorrect to speak of a beak, and there is, I think, no evidence of the existence of uncinatæ processes in *Hyperodapedon*.

Zittel's method differs from Lydekker's in this respect, that he entirely abstains from defining his suborders. We are therefore left to guess how the Proganosauria differ from the Rhynchocephalia *sensu stricto*, and for what reason, for instance, the *Champsosauridæ* are placed in the former group rather than in the latter. Then, again, as the *Proterosauridæ* are included in the Proganosauria, why is the latter term employed in preference to the name Proterosauria, which has priority? It is true this is but one instance out of many of Zittel's disregard of the rules of nomenclature. But does this group Proganosauria, originally founded upon *Stereosternum*, Cope, which is now generally accepted to be synonymous with *Mesosaurus*, Gerv., really belong to the Rhynchocephalia? This is a matter of considerable difficulty to decide, because the two essentially distinctive characters separating the Plesiosauria from the Rhynchocephalia, in the wide sense in which I would take these Orders, viz. the mode of implantation of the teeth and the presence or absence of a lower zygomatic arch in the skull, are not shown by the remains of *Mesosaurus* at present known. But considering other characters, such as the remarkable thickness of the ribs, the shape of the skull and teeth, the absence of claws, I cannot but agree with Seeley and Lydekker in regarding *Mesosaurus* as an early, generalized form of the Nothosaurs, which gradually pass into the long-necked, marine Plesiosaurs. The Proganosauria would nevertheless have to be considered as allies of the early Rhynchocephalia, from which they diverged in the Plesiosaurian direction, the Plesiosauria being, as I think all will now admit, closely connected with the Rhynchocephalia. The point as to whether *Mesosaurus* should be incorporated into the one or the other of these two orders can only, I repeat, be decided on a precise knowledge of the temporal arches and the dentition.

As regards the grouping of the Rhynchocephalian families, I hold that the *Champsosauridæ* should not be placed in a suborder apart from the true Rhynchocephalia, and less still together with *Palæohatteria* and *Proterosaurus*; and that the latter genera well deserve to rank as separate families. In fact, it seems to me that the only satisfactory arrangement of the Rhynchocephalia, on the basis of our present knowledge, may be expressed in the following synopsis. Forms of which we know too little, such as *Telerpeton*, *Saurosternum*, &c., are necessarily omitted.

Order RHYNCHOCEPHALIA.

Subord. 1. PROTEROSAURIA.

Each transverse segment of the plastron composed of numerous pieces. Pubis and ischium plate-like. Fifth metatarsal not modified.

Vertebrae conically excavated at either end, with persistent notochord, all with intervertebral hypapophyses; limb-bones without condyles; humerus with entepicondylar foramen 1. *Palæohatteriidae*.

Vertebrae fully ossified, cervicals opisthocœlous¹, dorsals biconcave; no hypapophyses between the dorsal vertebrae; limb-bones with condyles; humerus with ectepicondylar foramen or groove..... 2. *Proterosauridæ*.

Subord. II. RHYNCHOCEPHALIA VERA.

Each transverse segment of the plastron composed of three pieces, a median angulate and a pair of lateral. Pubis and ischium elongate and fifth metatarsal modified, as in the Lacertilia.

- A. Nasal openings distinct. Mandible with coronoid process, the rami not united by suture. Vertebrae deeply biconcave.
 Humerus with ectepicondylar and entepicondylar foramen; ribs with uncinatè processes; all the vertebrae with intercentral hypapophyses 3. *Hatteriidæ*.
 Humerus with entepicondylar foramen; ribs without uncinatè processes; no hypapophyses between the dorsal vertebrae..... 4. *Homœosauridæ*.
 B. Nasal opening single. Mandible without coronoid process, the rami united in a solid symphysis. Vertebrae fully ossified, feebly biconcave; no hypapophyses between the dorsal vertebrae. Humerus with ectepicondylar foramen or groove.
 Snout short, ending in a beak 5. *Rhynchosauridæ*.
 Snout Crocodilian in shape, with toothed præmaxillaries 6. *Champsosauridæ*.

The first family comprises a single genus, *Palæohatteria*, Credn.; the second, *Proterosaurus*, H. v. Mey., and perhaps *Cadaliosaurus*, Credn., and *Aphelosaurus*, Gerv.; these four types are Permian. The third family is for the recent *Sphenodon*, Gray; the fourth contains the Jurassic *Homœosaurus*, H. v. Mey., *Sapheosaurus*, H. v. Mey., and *Pleurosaurus*, H. v. Mey.; the fifth the Triassic *Rhynchosaurus*, Ow., and *Hyperodapedon*, Huxley; the sixth and last the Upper Cretaceous and Lower Eocene *Champsosaurus*, Cope.

6. Preliminary Account of an Earthworm from West Africa referable to a new Genus. By FRANK E. BEDDARD, M.A., F.R.S.E., Prosector to the Society.

[Received February 17, 1891.]

The investigations of Rosa², Michaelsen³, and myself⁴ have

¹ I think, after careful examination of the type specimen in the College of Surgeons, that the cervical vertebrae were opisthocœlous in *Proterosaurus*, as described by Seeley; that hypapophyses were absent, except between the anterior-most cervical vertebrae; and that the long, slender cervical ribs were forked proximally.

² "Lombriichi dello Scioa," Ann. Mus. Civ. Genova, vol. vi. (1888).

³ "Beschreibung der von Herrn Dr. Franz Stuhlmann im Mündungsgebiet des Sambesi gesammelten Terricolen," Jahrb. Hamb. Wiss. Anstalt, Bd. vii. (1890); and "Oligochæten des naturhistorischen Museums in Hamburg, IV.," *ib.* Bd. viii. (1891).

⁴ "Preliminary Note on a new Earthworm belonging to the Family Eudrilidæ," Zool. Anz. no. 346 (1890); and "Preliminary Note upon *Heliodrilus*, a new Genus of Eudrilidæ," *ib.* No. 349 (1890).